

# Can Kentucky Bluegrass Cultivars Be Effectively Selected For Fairways and Roughs?



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During the last couple of months two articles dealing with the same topic, Kentucky bluegrass cultivars as fairways and roughs, caught my attention. Since my appointment as a researcher and extensionist at the University of Wisconsin-Madison we have been working on similar research, the genetic characterization of Kentucky bluegrass cultivars using DNA marker technology. We would like to contribute additional information obtained through the recent research for superintendents to make a wise choice of Kentucky bluegrass cultivars.

Dr. John Stier from the University of Wisconsin-Madison wrote a review article titled

"Fairway Grass Selection" published in Grass Roots (John, 2000). He made a concise and full discussion of the on pros and cons for each category of Kentucky bluegrass cultivars recommended for fairways in Wisconsin. These recommendations were based on the Kentucky bluegrass classification developed by researchers at Rutgers University (Murphy, 1997).

Another article with a similar topic was just published by researchers at Rutgers University in Golf Course Management (Bonos et al., 2000b), entitled "Kentucky bluegrasses make comeback on fairways, roughs". The paper talks about a more detailed classification of Kentucky

bluegrass cultivars based on morphological characteristics (growth habits and performance in fields) and disease reactions than the previously published ones (Murphy et al., 1997; Bonos et al., 2000a).

Additionally, blending options for each category of bluegrass cultivars were recommended. They also made an intelligent argument for planting Kentucky bluegrass cultivars for fairways and roughs by illustrating the great disease pressure on perennial ryegrass. P. ryegrass is very susceptible to gray leaf spot caused by *Pyricularia grisea* common in southern regions of US, the disease favors prolonged periods of high humidity and relatively high air temperature (>80F) for infection.

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Incidentally, the deadly disease is not a problem in Wisconsin areas mainly due to two reasons, 1) little perennial ryegrass cultivars (host source) are growing in our environment because of the lack of cold tolerance; 2) the fungal pathogen has not adapted to our climate yet.

Eight months ago the Wisconsin Sod Producers agreed to support our research proposal "Genetic characterization and fingerprinting of Kentucky bluegrass cultivars using DNA marker". We would like to share some information learned from the research in order to help superintendents who are considering replacing fairways with Kentucky bluegrass cultivars to make a good choice.

The two articles made a similar conclusion; they suggested a blend of different types of bluegrass cultivars for optimal performance. In order to meet the requirement, cultivars in the blend must have not

only similar quality (appearance, leaf texture, and color), but maintain also maximum genetic diversity among them in order to prevent them from being devastated by abiotic and biotic stresses. Maximizing genetic diversity of cultivars in blending is not an easy task with currently available information. Very limited number of morphological traits were utilized for the classification of Kentucky bluegrass cultivars. Also, the morphological traits used are very sensitive to environment, meaning the expression of traits is largely influenced by environment. Therefore, the morphological traits based classification could lead an erroneous conclusion. That is exactly why a study of genetic relationships among Kentucky bluegrass cultivars using a DNA marker type, RAPD (random amplified polymorphic DNA) called "rapid" should be done.

We had major research objec-

tives. First, how much genetic variability (difference in DNA level) exists in Kentucky bluegrass cultivars? This question is important because if continued selection from the same material can narrow the genetic base of elite material and ultimately increase the potential vulnerability to abiotic and biotic stresses. Secondly, is the classification based on morphological traits similar to ones based on DNA marker? Thirdly, is it possible to fingerprint (differentiate) each cultivar using a fast and accurate DNA marker technology? The advantages of using DNA markers compared to morphological traits are as follows:

1. an unlimited number of polymorphism (never ran out of the number of difference among samples),
2. easy collection of data (morphological traits must be evaluated in field with replications), and
3. environmentally neutral (the expression of morphological traits

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varies according to where plants are growing but DNA never changes).

In conclusion, when bluegrass cultivars need to be selected for the blend used in golf course fairways, roughs, or any place, very careful consideration is recommended. Based on results of previous research and our current research, here are some suggestions, which will help superintendents choose the right cultivars for their needs.

1. To consider information on morphological characteristics of old cultivars from published papers listed above and newer cultivars from a recent year's NTEP results, especially conducted under similar climatic conditions.
2. To consider information on their pedigree (the record of the ancestry, parents involved in the development of a particular cultivar) from seed company's breeders. The reason is that our results indicate that cultivars with different names do not necessarily mean they are genetically different from each other.
3. To consider information on DNA markers/sequences based genetic similarity/dissimilarity. We understand it sounds silly. However, if you did not ask of them now, researchers in public and private sectors simply will not plan a future research. Three (BVMG, Compact-Midnight, and Compact-Midnight) out of 12 types with in three categories were correlated with groups of DNA marker derived genetic distance. As soon as our current research project is fully completed, then more information will be available to the public. We strongly feel that more systematic and through research on this topic needs to be accomplished in the near future as more cultivars are developing and the importance

of Kentucky bluegrass is increasing every year.

In present time we are looking at other technologies to improve or reconfirm what we knew about the genetic relationship of Kentucky bluegrass cultivars using DNA marker technology.

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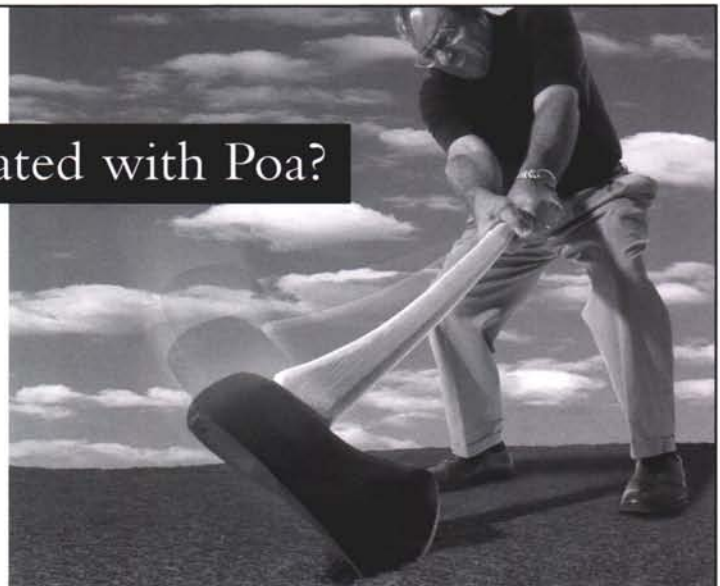
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